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Directorate of Intelligence

Science and Weapons Review

Tuesday
20 October 1992

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Science and Weapons Review

A Publication of the
Office of Scientific & Weapons Research

Tuesday, 20 October 1992

EUROPE/JAPAN: Cold Fusion Continues To Bubble

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1 *Researchers have continued to try to reproduce low-temperature nuclear fusion in the laboratory and have reported the observation of unusual phenomena. We believe these phenomena are unlikely to be the basis for a new energy source; it is possible, however, that an electrochemical process is involved and that this research could lead to applications in the area of fuel cells.*

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EUROPE/JAPAN

Cold Fusion Continues To Bubble (b)(3)

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Nuclear, Biological, and Chemical Division

ACCORDING TO THE 5 September 1992 issue of the European *NEW SCIENTIST* magazine, Martin Fleischmann presented a talk on cold fusion to a recent meeting of the British Association for the Advancement of Science. Fleischmann, a British chemist, and his American colleague Stanley Pons announced in 1989 that they had produced nuclear fusion in a test tube of heavy water at room temperature.

Fleischmann said that he and Pons are now working on cold fusion at a secret laboratory in France funded mainly by Technova, a think tank set up by the Japanese Ministry of International Trade and Industry (MITI). He showed a video in which the heavy water bubbled violently and evaporated. This 11-minute burst of activity occurred after a week of steady operation. He stated that the palladium electrodes used in the apparatus occupy just 0.04 cubic centimeter, adding "this is as big as we can make it safely." Based on these results, Fleischmann calculates that cold-fusion cells could generate 1 kilowatt of power per cubic centimeter of fuel, a performance comparable to that of a fast-breeder reactor.

At the same meeting, Frank Close, a British nuclear physicist and cold-fusion critic, confronted Fleischmann. Close pointed out that the very large number of neutrons, alpha particles, or gamma rays expected to accomplish nuclear fusion have not been observed. Fleischmann countered by suggesting that a different form of nuclear fusion was taking place because the process happened not in the gas phase, as studied by physicists, but in the solid lattice of the palladium electrode.

According to a Japanese newspaper, researchers at Osaka University led by Akito Takahashi have reproduced cold fusion. The researchers claim that, in a one-month experiment starting in December 1991, their apparatus generated an average amount of heat per cubic centimeter equal to 10 times the amount produced in a fuel rod of a nuclear reactor. The number of neutrons they measured decreased as the amount of heat generated increased.

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In July 1992, a State Department official talked to deputy director Nakatomi of the Electrical Power Technology Division (EPTD) of MITI. Nakatomi stated that MITI is funding a survey of recent cold-fusion research. He added that it is interested in whether the mechanism involved in cold-fusion experiments deserves to be studied further for possible applications in fuel cells.

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According to the British science magazine *NATURE*, in mid-July 1992 MITI's Natural Resources and Energy Agency confirmed newspaper reports that it is hoping to start a government-industry project to pursue the possible application of cold-fusion research in the energy industry. Tomihiro Taniguchi, director of EPTD at MITI, stated that electric utility companies and materials processing industries are interested in the research.

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Comment:

Although the cold-fusion phenomena remain an enigma, we believe they are not likely to be the basis of a new power source for mankind. Proponents have not done the systematic experimentation necessary to demonstrate the nature of the mechanism involved and must invoke new physics to explain their results. Questions remain about how much energy is introduced into the apparatus over long time periods before significant activity begins and how this compares to the energy released. All cold-fusion experiments have been done

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on a laboratory scale; questions related to scaling the apparatus to commercial scale have not been addressed.

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We judge that the heat-producing process involved in cold fusion is not a nuclear one. If it is therefore an electrochemical process, any large payoff from cold-fusion research in the field of energy sources most likely will be in the area of fuel cells. If the MITI approach is to search for applications to fuel-cell technology, it would appear to be a prudent one and the one most likely to reap benefits in the near term. Potential applications in materials processing also seem likely.

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